

Serial No. 10/806,198

BESTE et al.

PF++54391

constitutes an impurity which is to be removed from the ionic liquids.³⁾ Additionally, applicants have further specified the nature of the polar, high boiling compound which contaminates the ionic liquid and which is sought to be removed by the claimed process on the basis of the information provided on page 11, indicated lines 14 to 21, of the application as a compound "*which cannot be removed completely from the ionic liquids by way of a distillation and/or which has a vapor pressure of less than about 10 mbar at room temperature.*"⁴⁾ No new matter has been added.

The clarifications in the claims are deemed to fully obviate the issues which were maintained and/or raised by the Examiner in the final Office action and are, therefore, considered to place the application in condition for allowance. Favorable action is respectfully solicited.

The Examiner rejected Claims 1 to 3, 8 to 11 and 13 under 35 U.S.C. §102(b) as being anticipated by, and in the alternative under 35 U.S.C. §103(a) as being rendered obvious by, the teaching of *Earle et al.* (US 2004/0015009).

The respective reference addresses a process for the oxidation of alkyl-aromatic compounds which is conducted in the presence of an ionic liquid.⁵⁾ Additionally, *Earle et al.* mention:⁶⁾

This invention also allows for the separation of the ionic liquid and product by physical or chemical means such as distillation, steam distillation, azeotropic distillation, sublimation, gravity separation, solvent extraction, crystallization, supercritical fluid extraction and chromatography.

The separation referred to by *Earle et al.* is, however, as further study of the document reveals, primarily a separation of the product without regard to the purity of the ionic liquid. This fact is, for example, apparent from the explanations provided on page 8, paras. [0042] and [0043] of the reference, which point out that a combination of ionic liquid/acidic promoter can be separated from the product and can be recycled and reused.

When taken as a whole for what it reasonably conveyed to a person of ordinary skill in the art, the teaching of *Earle et al.* accordingly provides information which is pertinent with regard to the preparation and purification of the oxidation product. The purity of the ionic liquid which is employed and/or recycled in the course of the oxidation procedure is of no concern to *Earle et al.* and accordingly the reference does not convey any information which is pertinent to considerations which have to be taken into account in the purification of ionic acids, i.e. the subject matter of applicants' invention.

While the teaching of *Earle et al.* may be considered to disclose that distillation and chromatography are interchangeable methods as the Examiner stated on page 8 of the Office action, the inter-

3) Cf., e.g., page 11, indicated lines 14 to 21, of the application.

4) Cf. also page 14, indicated lines 15 to 34, of the application.

5) Cf., e.g., page 1 para. [0001], of US 2004/0015009.

6) Cf. page 1, para. [0008], of US 2004/0015009.

Serial No. 10/806,198

BESTE et al.

PF++54391

changeability of the methods is clearly only applicable to the extent that *Earle et al.*'s separation of the oxidation product from the reaction mixture is concerned. The interchangeability of the methods with regard to the purposes of *Earle et al.*'s procedure can, however, not be considered as a suggestion that a similar interchangeability exists where other components are to be purified. In fact, the interchangeability does not apply where applicants' purification method is concerned, as is expressed in applicants' claims as herewith presented and explained, for example, on page 11, indicated lines 14 to 21, of the application, since the impurity which is to be removed in accordance with applicants' inventions is a "polar, high boiling compound which cannot be removed completely from the ionic liquids by way of a distillation and/or ...".

Anticipation under Section 102 can be found only if a reference shows exactly what is claimed.⁷⁾ The fact that claimed subject matter may be encompassed by a generic disclosure does not by itself establish obviousness of the claimed subject matter,⁸⁾ and anticipation is the ultimate or epitome of obviousness.⁹⁾ Anticipation under Section 102 requires therefore more than a generic disclosure which encompasses claimed subject matter. The test for anticipation is one of identity which means that the identical invention must be shown in the reference in as complete detail as is contained in the claim.¹⁰⁾ In fact, the Federal Circuit has stated that it is error to treat claims as a catalog of separate parts, in disregard of the part-to-part relationships set forth in the claims that give those claims their meaning.¹¹⁾ Under these guidelines which were developed by the Courts regarding anticipation under Section 102 the teaching of *Earle et al.* can clearly not be deemed to anticipate the subject matter of applicants' claims.

The teaching of *Earle et al.* can also not be deemed to render applicants' invention prima facie obvious within the meaning of Section 103(a). The Examiner took the position that it would have been obvious to optimize the elements of *Earle et al.* to enhance the separation. However, a particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.¹²⁾ The teaching of *Earle et al.* does not address, or even

7) Cf. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985); *In re Marshall* 577 F.2d 301, 198 USPQ 344 (CCPA 1978); *In re Kalm* 378 F.2d 959, 154 USPQ 10 (CCPA 1967).

8) Cf. *In re Baird*, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); see also *Corning Glass Works v. Sumitomo Electric U.S.A.*, 868 F.2d 1251, 9 USPQ2d 1962 (Fed. Cir. 1989), which holds that a genus does not inherently disclose all species; and *In re Jones*, 958 F.3d 347, 21 USPQ2d 1614 (Fed. Cir. 1992), which holds that a genus does not render all species that happen to fall within the genus obvious.

9) Cf. *In re Grose*, 592 F.2d 1161, 201 USPQ 57 (CCPA 1979).

10) Cf. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989).

11) Cf. *Lindemann Maschinenfabrik v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984).

12) *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.).

Serial No. 10/806,198

BESTE et al.

PF++54391

suggest or imply, parameters which are critical with regard to the purification of ionic acids so that the reference accordingly cannot be taken as a starting point for optimizing parameters with a view to a purification of ionic acids. To the contrary, any optimization conducted on the basis of the teaching of *Earle et al.* would have to aim at improving the purity of the oxidation product. As noted above, the purity of the ionic liquid which is employed and/or recycled in the course of the oxidation procedure is of no concern to *Earle et al.* and accordingly the reference does not convey information pertaining to the purification of ionic liquids. The Examiner's position that applicants' process is a mere optimization of the procedure of *Earle et al.* is, therefore, not deemed to be well taken.

Moreover, three basic criteria have to be met in order to establish a *prima facie* case of obviousness.¹³⁾

- (1) There must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine the reference teachings,
- (2) there must be a reasonable expectation of success, and
- (3) the prior art reference or the combined references must teach or suggest all of the claim limitations.

Additionally, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and cannot be based on the applicant's disclosure.¹⁴⁾ At least two of those three basic criteria are not met where the teaching of *Earle et al.* and applicants' invention are concerned.

On the one hand, the suggestion or motivation to do what applicants have done is lacking. The teaching of *Earle et al.* recycles used ionic liquid in mixture with used acidic promoter and the presence of either starting materials or product in the recycled matter is of no consequence. Accordingly, the reference cannot reasonably motivate a person of ordinary skill in the art to seek out possibilities to purify the ionic acids. On the other hand, the reasonable expectation of success is lacking because the teaching of *Earle et al.* is silent with regard to means or measures which are suitable to achieve the goal of purifying an ionic liquid. Accordingly, the teaching of *Earle et al.* cannot be deemed to render applicants' process *prima facie* obvious within the meaning of Section 103(a).

In light of the foregoing it is respectfully requested that the rejection of Claims 1 to 3, 8 to 11 and 13 under Sections 102(b) and 103(a) based on the teaching of *Earle et al.* be withdrawn. Favorable action is solicited.

For essentially the same reasons the Examiner's arguments for rejecting Claims 1 to 3, 8 to 11 and 13 under Section 103(a) based on the teaching of *Earle et al.* (*ibid.*) alone or when taken in view

13) Cf. MPEP §2143.

14) *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991).

Serial No. 10/806,198

BESTE et al.

PF++54391

of the disclosures of *Hackh's* Chemical Dictionary and either *Kawaki et al.* (US 5,543,447) or *Thiem et al.* (US 4,751,291) are not deemed to apply to the claims as herewith presented by applicants.

The Examiner applied in this context the disclosures of *Hackh's* Chemical Dictionary, of *Kawaki et al.* and of *Thiem et al.* to show that certain compounds which are encountered in the procedure of *Earle et al.* can be considered as high boiling and polar compounds. However, whether or not these compounds are within the realm of the "polar, high boiling compound which cannot be removed completely from the ionic liquid by way of a distillation and/or said compound has a vapor pressure of less than about 10 mbar at room temperature," is not deemed to be of consequence in the determination of obviousness of applicants' invention. According to the procedure addressed in the teaching of *Earle et al.*, the used ionic liquid remains to be "contaminated" with used acidic promoter and, as pointed out, the presence of either starting materials or oxidation product in the used ionic liquid is of no consequence since the ionic liquid/acid promoter is recycled. While certain amounts of the oxidation products are removed by distillation, the primary reference contains nothing which would suggest or imply that the respective isolation of the product at the same time provides for a purification of the ionic liquid from the impurities which are removed in accordance with applicants' process.

Neither one of the secondary references can therefore be considered to add the suggestion or motivation to do what applicants have done. Even when the teaching of *Earle et al.* is taken in view of the referenced disclosures a person of ordinary skill in the art would not have been motivated to purify the ionic liquids from any polar, high boiling compounds because such compounds are, in the procedure of *Earle et al.*, valuable constituents of the recycled stream. The referenced disclosures can also not be deemed to contribute to a reasonable expectation of success since neither one of the secondary references nor the teaching of *Earle et al.* is reasonably concerned with the purifying an ionic liquid from the contaminating impurities specified in applicants' claims.

In light thereof, it is respectfully requested that the rejection of Claims 1 to 3, 8 to 11 and 13 under Section 103(a) based on the teaching of *Earle et al.* when taken alone or when taken in view of the disclosures of *Hackh's* Chemical Dictionary and either *Kawaki et al.* or *Thiem et al.* be withdrawn. Favorable action is solicited.

The Examiner further rejected dependent claims under Section 103(a) based on the teaching of *Earle et al.* (ibid.) alone or view of *Hackh's* Chemical Dictionary and either *Kawaki et al.* (ibid.) or *Thiem et al.* (ibid.), and further in view of *Snyder (Introduction to Modern Liquid Chromatography, John Wiley & Sons New York, 1979, pages 270-272, 285, and 410-411)*; or further in view of *Gerhold (US 4,402,832)*;

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Serial No. 10/806,198

BESTE et al.

PF++54391

or further in view of *Wasserscheid et al.*'s "*Ionic Liquids in Synthesis*."¹⁵⁾ However, If an independent claim is non-obvious under 35 U.S.C. §103, then any claim depending therefrom is non-obvious.¹⁶⁾

The disclosure of *Snyder* is applied by the Examiner in this context for stating that ion exchange was the first of various liquid chromatography methods to be used widely under modern conditions, and the Examiner argued that a person of ordinary skill in the art would therefore have been motivated to employ ion exchange in the separation conducted in the procedure of *Earle et al.* The respective separation of *Earle et al.* is, as explained above, directed to a purification of the oxidation product and not, as required in accordance with applicants' invention, to a purification of the ionic liquid. Accordingly, a modification of the procedure of *Earle et al.* in view of the disclosure of the secondary references including the disclosure of *Snyder* does not result in the process disclosed and claimed by applicants.

The same applies, mutatis mutandis, where the Examiner applies the disclosure of *Gerhold* as motivating a person of ordinary skill in the art to employ a simulated moving bed procedure in the separation conducted by *Earle et al.* Again, a modification of the procedure of *Earle et al.* in view of the disclosure of the secondary references including the disclosure of *Gerhold* does not result in the process disclosed and claimed by applicants because the separation of *Earle et al.* does not aim at a purification of the ionic liquid.

The disclosure of *Wasserscheid et al.* was applied by the Examiner in the context of a rejection of Claim 11, and for stating that any volatile compound may be removed from an ionic liquid by distillation. The respective statement is, however, of no relevance where the pertinent provisions of applicants' process according to Claim 8 are concerned which are incorporated in Claim 11 by reference.

With regard to all of these arguments made by the Examiner, he reasons why two of the three basic criteria for establishing a prima facie case of obviousness under Section 103(a) which were set forth in the foregoing are, therefore, equally applicable. Accordingly, applicants respectfully request that the respective rejections of Claims 2, 4, 6, 7, 9, 11 and 12 under Section 103(a) be withdrawn. Favorable action is solicited.

Additionally, the Examiner rejected Claims 1 to 4 and 6 to 13 under 35 U.S.C. §112, ¶2, as being indefinite for failing to allow a determination of the meaning of "*high boiling compounds*."

- 15) (a) Claims 2, 6, 7, 9 and 12 based on the teaching of *Earle et al.* alone or in view of *Hackh's* and either *Kawaki et al.* or *Thiem et al.*, and further in view of *Snyder* (*Introduction to Modern Liquid Chromatography*, John Wiley & Sons New York, 1979, pages 270-272, 285, and 410-411);
(b) Claim 4 based on the teaching of *Earle et al.* alone or in view of *Hackh's* and either *Kawaki et al.* or *Thiem et al.*, and further in view of *Gerhold* (US 4,402,832); and
(c) Claim 11 based on the teaching of *Earle et al.* alone or in view of *Hackh's* and either *Kawaki et al.* or *Thiem et al.*, and further in view of *Wasserscheid et al.*'s "*Ionic Liquids in Synthesis*."

- 16) *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

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- 6 -

BEST AVAILABLE COPY

Serial No. 10/806,198

BESTE et al.

PF++54391

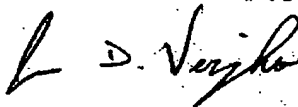
Favorable reconsideration of the Examiner's position and withdrawal of the respective rejection is respectfully solicited in light of the clarifying wording "... compound which cannot be removed completely from the ionic liquids by way of a distillation and/or which has a vapor pressure of less than about 10 mbar at room temperature" which applicants have added to Claims 1 and 8.

In light of the foregoing and the attached, the application should now be in condition for allowance. Favorable action is solicited. Early action by the Examiner would be greatly appreciated by applicants.

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees, to Deposit Account No. 14.1437. Please credit any excess fees to such deposit account.

Respectfully submitted,

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Encl.: CLAIM AMENDMENTS (Appendix I)

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